

# **Update: Drive Clean Program Emissions Benefit Analysis and Reporting – Light Duty Vehicles and Non- Diesel Heavy Duty Vehicles – 2008**

## **Introduction**

Smog is a serious health-related problem in Ontario. Motor vehicles are a major domestic source of smog in Ontario and a source of several other toxic contaminants. The Drive Clean program reduces smog-causing emissions by requiring on-road vehicles to undergo an emissions test to identify emissions problems, and have necessary repairs made before licence plate renewal or ownership transfer.

The light duty vehicle and non-diesel heavy-duty Drive Clean program area extends from Windsor to Ottawa, which includes the area of southern Ontario that experiences the highest number of smog advisory days in the province. The program area includes the majority of light duty vehicles in the province.

A full report providing an analysis of Drive Clean emissions reductions to the end of 2005 (**Drive Clean Program Emissions Benefit Analysis and Reporting – Light Duty Vehicles and Non- Diesel Heavy Duty Vehicles – 1999 to 2005**) is posted on the Drive Clean website ([www.driveclean.com](http://www.driveclean.com)). The report was prepared by an independent consultant, Stewart Brown Associates (SBA). This update extends the 2005 results of the analysis to the end of 2008.

## **Key Findings:**

From 1999 to 2008, Drive Clean reduced smog-causing emissions of hydrocarbons (HC) and nitrogen oxide(s) (NOx), from light duty vehicles (LDVs) by an estimated 266,000 tonnes. During the same period, the program also reduced emissions of carbon monoxide (CO), a poisonous gas, by over 2.48 million tonnes; and carbon dioxide (CO<sub>2</sub>), a greenhouse gas, by about 256,000 tonnes.

In 2008 alone, Drive Clean reduced the combined emissions of smog causing pollutants HC and NOx, as well as CO, by about 35 percent from what they would have been without the program. This means that Drive Clean has resulted in the elimination of tens of thousands of tonnes of smog-causing pollutants each year.

The Drive Clean program, along with advances in cleaner fuels and vehicle technology, has contributed to significant emissions reductions as a result of the mandatory requirement for vehicle emissions testing and repairs.

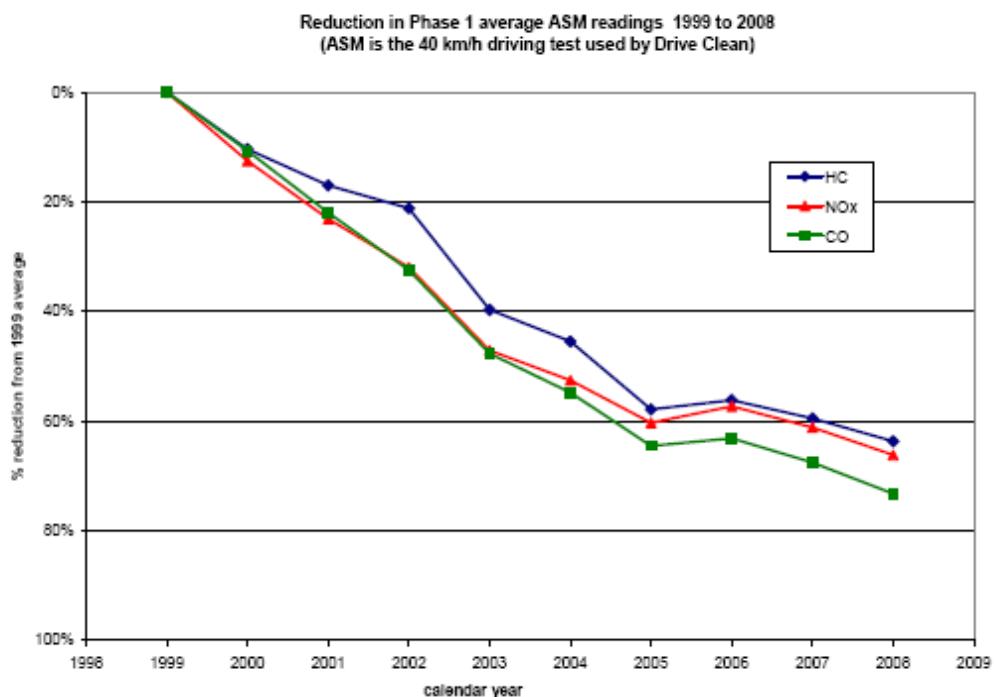
## Drive Clean Impact

Since the start of the program, Drive Clean testing requirements, coupled with vehicle turnover, improved vehicle technology, cleaner fuels and better vehicle maintenance have reduced the average tailpipe emissions of Ontario vehicles.

Graph 1 shows the average emissions measured from all tested vehicles in the Greater Toronto Area and Hamilton (identified as "Phase 1") from 1999 to 2008 during the Acceleration Simulation Mode (ASM) portion of the Drive Clean test. The graph shows a drop of nearly 70 percent in the average concentration of contaminants since the program's introduction.

The results reported are a snapshot of the average vehicle emissions under the specified ASM test conditions. As vehicle emissions vary, Graph 1 depicts the trend, rather than an actual measure, of how overall emissions in tonnes have been reduced over time.

### Graph 1:

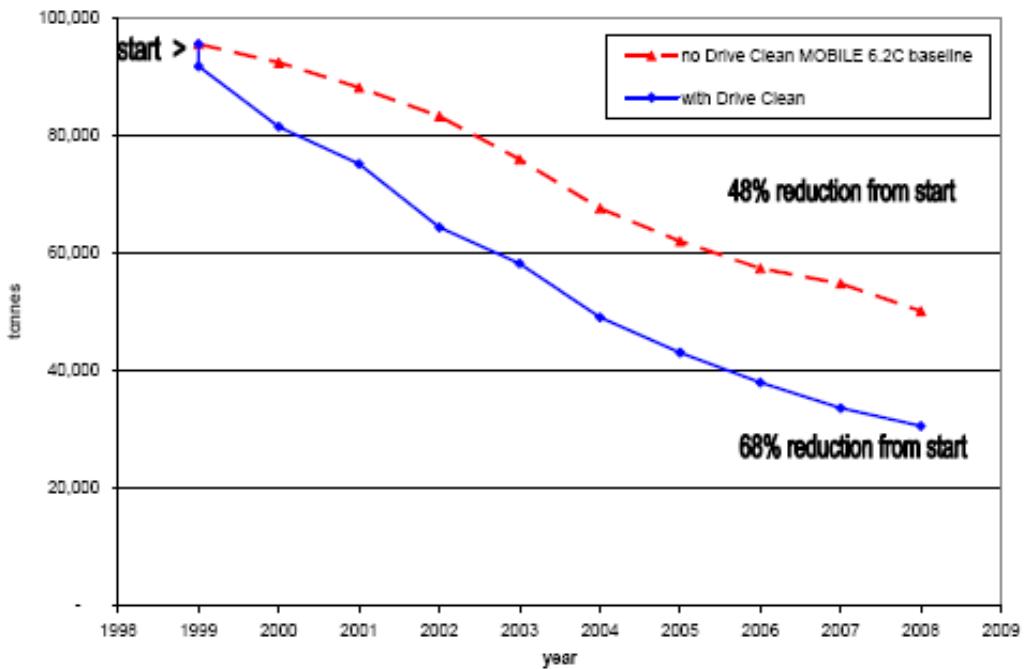


## Drive Clean Impact – Reductions in Fleet Emissions Since 1999

Estimates of emissions from the whole fleet of vehicles in the Greater Toronto Area and Hamilton show that, without the Drive Clean program, Ontario's fleet would have experienced a 48 percent reduction in emissions relative to the start of the program in 1999. However, with the Drive Clean program in place, estimates show that a 68 percent reduction in emissions has been achieved since that time, as shown in Graph 2 below. This means that Drive Clean lowered smog-causing emissions by a further 20 percent from what would have occurred without the program in place between 1999 and 2008.

**Graph 2:**

### Reduction of Smog-Causing Emissions HC + NOx in the Greater Toronto Area and Hamilton, 1999 - 2008



Since the start of the program in 1999 to the end of 2008, Drive Clean reduced smog-causing emissions (HC + NOx) from LDVs in the entire program area by an estimated 266,000 tonnes. During the same period, the program also reduced emissions of CO by over 2.48 million tonnes (see Table 1), and CO<sub>2</sub> by about 256,000 tonnes.

**Table 1:**

Year	Emissions Reductions Due to Drive Clean (Tonnes)			
	CO	HC	NOx	HC + NOx
<b>1999</b>	42,226	2,558	1,210	3,768
<b>2000</b>	105,915	6,942	3,975	10,917
<b>2001</b>	144,464	9,369	5,936	15,306
<b>2002</b>	271,257	14,232	12,508	26,741
<b>2003</b>	300,805	14,563	13,102	27,665
<b>2004</b>	291,715	17,552	14,445	31,997
<b>2005</b>	299,409	18,032	15,900	33,933
<b>2006</b>	314,400	18,902	17,194	36,096
<b>2007*</b>	360,619	21,031	20,036	41,067
<b>2008</b>	359,171	19,480	18,578	38,057
<b>Totals</b>	<b>2,489,980</b>	<b>142,662</b>	<b>122,885</b>	<b>265,547</b>

\* 2007 figures have been recalculated from previous report update to account for increased vehicle use in Ontario.

In 2008, Drive Clean was responsible for reducing smog-causing emissions (HC and NOx) by 38,057 tonnes. The Drive Clean program reduced harmful vehicle emissions from between 34.6 percent to 38.2 percent relative to the emissions that would have been expected in 2008 without the program, as identified in Table 2.

**Table 2:**

Drive Clean Emissions Reductions in 2008 Tonnes (%)			
CO	HC	NOx	HC+NOx
359,171 (37.1%)	19,480 (38.2%)	18,578 (34.6%)	38,057 (35.8%)

### Drive Clean Program Impact on Fuel Consumption and CO<sub>2</sub>

During 2008, 155,620 vehicles failed their initial emissions test and were repaired partially or completely. These repairs would save vehicle owners about 10 million litres over the two-year period and equate to a reduction in CO<sub>2</sub> emissions of 23,900 tonnes.

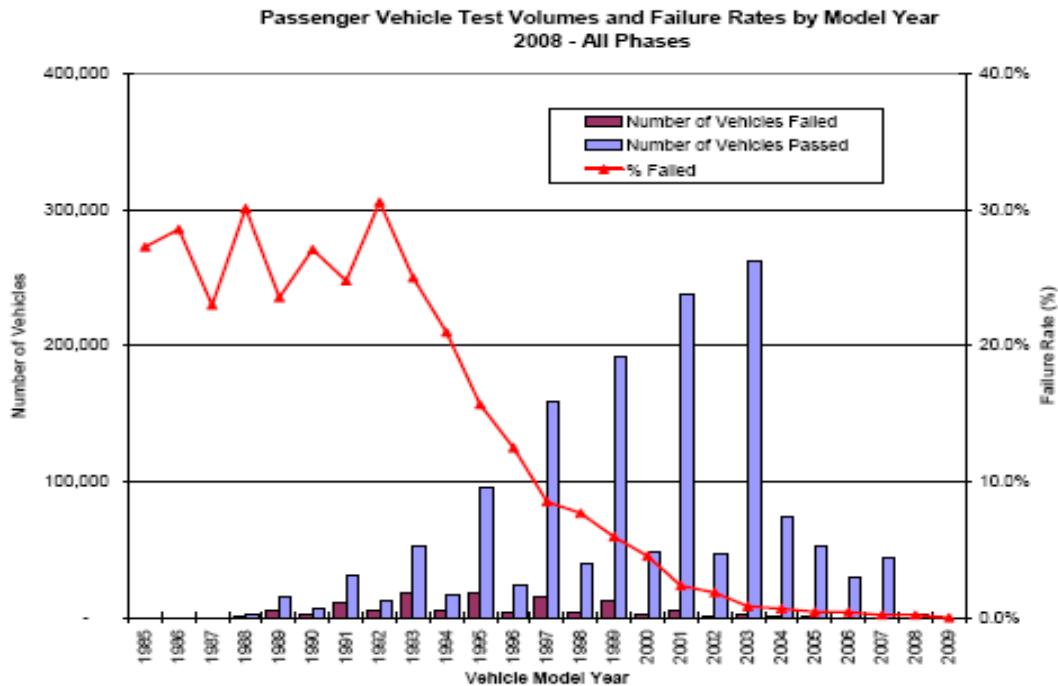
Carbon dioxide emission reductions from the start of the program in 1999 to 2007 were previously estimated at 232,000 tonnes. The total reductions from 1999 to 2008 were about 256,000 tonnes.

## Drive Clean Test Volumes and Failure Rates

Graph 3 shows the emissions test results for passenger vehicles of each model year that were tested in 2008. The pattern clearly reflects the biennial nature of the program, with 'OFF' model years being a small fraction of 'ON' model years - both for the number of vehicles that were tested, and for the number that failed.

The greatest number of vehicles that failed in 2008 were from model years 1993 and 1995. Prior to model year 1993, the percentage of failing vehicles increased, but fewer vehicles were tested. After model year 1995, more vehicles were tested but the percentage of vehicles failing decreased. A similar pattern was observed for light duty trucks tested in the program in 2008.

**Graph 3:**



## Drive Clean Repair Effectiveness

Drive Clean repair effectiveness can be measured by the passing rate of vehicles that fail the initial emissions test and require a re-test following repairs. Most vehicles that require repairs to meet Drive Clean standards are repaired enough to pass the Drive Clean re-test. The result is cleaner tailpipe emissions for Ontario vehicles, as a vehicle that passes the emissions re-test will have lower emissions compared to when it failed the initial test.

In 2008, 79 percent of vehicles that failed their initial Drive Clean test were repaired and retested resulting in a pass or conditional pass result (Table 3). This data does not include retests that may have been completed after 2008.

<b>Failed Vehicles</b>	<b>Failed Vehicles that passed retest</b>	<b>Failed Vehicles that got a conditional pass after re-test</b>	<b>Failed Vehicles without a pass or conditional pass</b>
159,337	105,225	20,638	33,474
100%	66.0%	13.0%	21.0%

### **Non-diesel Heavy Duty Vehicle (NDHDVs) Numbers and Failure Rates**

There are very few non-diesel heavy duty vehicles (NDHDVs) in the Drive Clean program. Only those NDHDVs registered in the same area as the light-duty vehicle program are required to undergo emissions testing.

In 2008, the number of NDHDVs tested was 13,697. The majority of the NDHDVs tested were gasoline powered, followed by propane and natural gas. Their overall failure rate was 13 percent in 2008.

While the total contribution by NDHDVs to the emissions inventory is very small, inclusion in Drive Clean is important as these vehicles have, on average, higher failure rates than LDVs and can be gross polluters.